

of emergency medicine and analysis of chemical warfare agents.

The bulk of the book contains “Chapters on specific toxins” including drugs of abuse, medicines, natural toxins, pesticides, a few metals, carbon monoxide, cyanide and what are termed “chemicals of daily necessities”, amongst others.

Each chapter includes an introduction to the compound and proposes analytical methods. Chemical formulae are included as well as some metabolic pathways. Mass spectra or chromatograms of some compounds are given; case studies for some compounds are detailed. Analytical details include obtaining reagents (manufacturers’ details included), preparation of samples and instrument conditions; there are a useful series of notes with advantages and disadvantages of the methods under the heading of “Assessment of the method” for some compounds, along with instances where suggested modifications to methods have been tried. The methods are mainly for body samples but there are also some for solid drug/poison materials as well, although there seems to be no consistency between chapters as to exactly what is included. For example, there are methods for analysis of drug materials for LSD, but none for it, or its metabolites, in body samples. There are methods for analysis of MDMA tablets and body samples but only for body samples for heroin/morphine use and none for the drug materials.

Analytical methods described vary from low-tech., e.g. TLC, to state of the art LC-MS/MS. However, as Marilyn Huestis states in her foreword, having ready access to a number of diverse analytical methods does not remove the necessity to validate each method in your own laboratory to apply them accurately. One concern is the minimal information about preliminary screening tests, such as

immunoassays, which are an essential first step for many analysts.

Although the book is subtitled “A Handbook of Practical Analysis”, it does go further than this to include some information to assist with interpretation, such as the pitfalls of post-mortem redistribution and some information on therapeutic, toxic and fatal levels, but has little pharmacokinetic data. For example, there is no information on alcohol elimination rates. However, there is insufficient information in the book for it to be considered useful enough as a significant resource for interpretation of results, but it is more than the title suggests, i.e., an analytical handbook.

Some chapters are of limited use, e.g. benzodiazepines, whereas some are more comprehensive and useful, such as that on GHB. Each chapter contains a list of references, again some of limited use, others much more useful. There are many typographical errors and the inevitable language translation inconsistencies.

As a starting point for someone new to analytical toxicology, this book will find a useful niche; experienced practitioners will find it less useful although there is something in here for everyone, provided you are aware of the many limitations.

M. Scott-Ham

Senior Forensic Scientist,
London Toxicology Section,
Forensic Science Service,
London Laboratory,
109, Lambeth Road,
London SE1 7LP,
United Kingdom

E-mail address: michael.scott-ham@fss.pnn.pdice.uk

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Anthony C. Moffat, M. David Osselton, Brian Widdop (Eds.), *Clarke's Analysis of Drugs and Poisons*, third edition, (2004) Pharmaceutical Press, London, ISBN: 0 85369 473 7

Previously known as *Clarke's Isolation and Identification of Drugs*, this completely revised and expanded third edition is both a practical manual and a standard reference work. It is intended to be the definitive source of analytical data on drugs and poisons and is aimed primarily at forensic scientists who are faced with identifying and quantifying these substances in body fluids and other products. However, such is the range and depth of the work that it will also have an appeal and value to a wider audience.

This new edition contains a large amount of fresh material and is effectively two distinct books. Volume 1 has 18 chapters on general topics that will be of particular interest to a broader readership including forensic physicians, clin-

ical toxicologists and pathologists, while the remaining 13 chapters cover specific analytical techniques that are really only of specialist appeal. The chapters are written by over 40 international experts and include sections covering the application of toxicology in areas such as drugs of abuse, alcohol and drugs in driving, postmortem toxicology, drugs in saliva, hair analysis and volatile substances. These are authoritative statements that accurately reflect the current state of the art and are all well referenced.

In the chapter on drugs and driving, the authors compare the state of knowledge in relation to alcohol and drug impaired driving. Alcohol, the most widely abused drug, is also the best understood in terms of dose-related impairment, with numerous studies documenting the adverse effects of alcohol on driving at even the lowest concentrations at which we typically measure. The techniques for measuring alcohol in blood and breath are discussed and there is a use-

ful section on back-calculation. The situation is far more difficult with drugs as much less is understood about the way they impair driving and how that impairment can be correlated with the concentration of the drug in a person's system. Roadside impairment tests are evaluated and it is acknowledged that none of the standardised field sobriety tests have been validated specifically for different patterns of drug use. When dealing with drug impaired drivers, the nature of the laboratory specimen chosen for analysis by law enforcement agencies can pose additional problems. Although urine is an excellent specimen for answering the qualitative question "Did the donor at some time before the provision of this specimen use or ingest this drug?" it is of little quantitative use because the concentration of drugs in urine is as dependent on the volume of liquid consumed, the degree of hydration of the subject and the time of ingestion as it is on the amount of drug ingested.

The chapter on drugs in sport includes much of interest but the decision to discuss humans and animals together, rather than as separate topics, can be distracting. For example, we learn that urine samples are collected almost invariably by relying on test subjects voiding naturally and that "*Greyhounds urinate very readily after being released from their transporter; 96% of horses in Britain urinate within 1 h of racing; humans can generally urinate at will*". The latter fact will come as little surprise to most readers!

An excellent chapter on postmortem toxicology cautions forensic toxicologists and others from referring to tables that list therapeutic, toxic and fatal concentrations when interpreting postmortem levels of drugs. While these tables may be of some use in clinical toxicology, they can be misleading when used to interpret postmortem toxicology results because they are drawn extensively from data collected in the living; seldom take into account tolerance; and do not allow for phenomena such as postmortem redistribution.

Volume 2, which constitutes the largest section of the work, is divided into two parts. The first part contains over 1700 monographs on individual drugs and poisons detailing physical properties, analytical methods, pharmacokinetic data, ultraviolet, infra-red and mass spectra, and therapeutic and toxicity data. Whilst much of this data will be of interest only to toxicologists, the section for each drug entitled 'Disposition in the Body' will have wider appeal as it gives data on the likes of therapeutic concentration, toxicity, bioavailability, half-life and volume of distribution, which will be of use to clinicians when interpreting drug levels in a given case. The inclusion of abstracts from published clinical studies and case histories, where available, is particularly valuable.

Volume 2 concludes with a hefty section (Part 3) on drug data containing indexes of analytical data, which, once again, will be of less interest to the general reader.

This new edition has been four years in preparation and has been eagerly awaited by specialists in the field. I have no doubt it will find a prominent, and deserved, place in all laboratories involved in aspects of drug analysis. At a price of around £350 it will be hard for forensic physicians to justify the cost of a personal copy unless they are frequently involved in preparing expert reports on drug related matters. However, 'Clarke' is surely a must for all forensic libraries.

Dr. Guy A Norfolk
Forensic Physician
Association of Forensic Physicians,
Education and Research Committee,
Hollway Road,
Stockwood,
Bristol BS14 8PT, UK
E-mail address: guy.norfolk@btinternet.com